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AIRBORNE OCEANOGRAPHIC LIDAR (AOL) FLIGHT MISSION PARTICIPATION

by

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During this reporting period of February 1986 to the present, the AOL participated in six interagency flight missions. These were:

(1) Shelf Edge Exchange Processes (SEEP II) (Department of Energy). The SEEP II flight experiments were conducted on shelf and slope waters east of the Delmarva Peninsula during March and April 1988. The SEEP experiments are designed to assess the assimilative capacity of the Continental Shelf to absorb the energy by-products introduced into the near-shore ocean environment from coastal communities and marine activities such as energy production plants and offshore oil operations. During 1985, the AOL had participated in the SEEP I flight missions conducted in the New York Bight.

(2) BIOWATT II (Office of Naval Research). The BIOWATT II flights were conducted in a section of the Sargasso Sea east of Cape Hatteras. The major objective of this study was to provide a better understanding of the relationships between ocean physics, biology, bioluminescence, and optics in oligotrophic portions of the Atlantic Ocean. During 1985, the AOL had participated in the BIOWATT I flight missions conducted in the Sargasso Sea south and west of Bermuda.

(3) Fall Experiment (FLEX) (Department of Energy). The FLEX missions were conducted over shelf and Gulf Stream waters between

Charleston, South Carolina, and Cape Canaveral, Florida. The FLEX studies were designed to determine the fate of low salinity water in the coastal boundary zone that is advected south towards the Florida coast during autumn. During 1985, the AOL had participated in the Spring Experiment (SPREX).

(4) Greenland Sea and Icelandic Marine Biological Experiments (NASA). These flights were conducted in conjunction with the NASA Arctic Ice Experiment. The investigations were designed to evaluate the distribution of surface layer chlorophyll in the Greenland Sea and in the coastal waters in the vicinity of Iceland.

(5) Submerged Oceanic Scattering Layer Experiment (Naval Ocean Systems Center). These flights were conducted over shelf, slope, Gulf Stream, and Sargasso Sea watermasses during June 1986. This flight experiment demonstrated for the first time the feasibility of detecting and metrically measuring the depth to submerged layers of particulate matter in the shelf break region and in the inner coastal zone.

(6) Microbial Exchanges and Coupling in Coastal Atlantic Systems (National Science Foundation). These flight investigations were conducted in shelf and slope watermasses east of Cape Henry, Virginia, during May 1986. This investigation was designed to study the transportation and fate of particulates in coastal waters and in particular the Chesapeake Bay/coastal Atlantic Ocean.

Shortly after the conduct of the flight experiments, airborne laser-induced chlorophyll a and phycoerythrin fluorescence data, as well as sea surface temperature and airborne expendable bathythermograph water column temperature profiles are supplied to cooperating institutions. Corroboration with participating scientists in the analysis of the data and publication of important findings are ongoing activities. During the past several years, numerous papers have been published on oceanic lidar applications to airborne measurement of chlorophyll, phycoerythrin, tracer dye concentration, oil film thickness and identification, monomolecular films, front mapping, water depth, and sea surface backscatter characteristics. Several papers have been recently published on active-passive (laser-solar) airborne ocean color methods for phytoplankton pigment concentration measurement, chlorophyll algorithm development, and general ocean color spectral variability studies.

Future plans call for AOL participation in the North Atlantic Spring Bloom Process Study of the Joint Global Ocean Flux Study. This multi-nation experiment is designed to improve the understanding of the spring bloom development in the open ocean. Research ships from Great Britain, Germany, The Netherlands, and the U.S. will conduct sampling along the 20 W transect in the Spring of 1989. It is anticipated that the AOL will conduct its overflights from both Iceland and Ireland.